REMARKS

By the present amendment and response, independent claims 24, 31, and 37 have been amended to overcome the Examiner's objections. Claims 24-26 and 28-48 are pending in the present application. Reconsideration and allowance of pending claims 24-26 and 28-48 in view of the following remarks are requested.

The Examiner has rejected claims 24-26 and 28-48 under 35 USC §103(a) as being unpatentable over Japanese patent number JP 402262308A by Tetsuya Yokogawa ("Yokogawa") in view of U.S. patent number 6,069,397 to Cornett et al. ("Cornett") and U.S. patent number 5,446,311 to Ewen et al. ("Ewen"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 24, 31, and 37, is patentably distinguishable over Yokogawa, Cornett, and Ewen, singly or in any combination thereof.

The present invention, as defined by amended independent claims 24 and 37, respectively, teaches, among other things, a conductor or inductor patterned in a "second area" of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a "first area" of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. As disclosed in the present application, the permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric

is increased, while a mask prevents the permeability conversion material from entering the first area of the dielectric, which is situated adjacent to but not situated over or underneath the second area of the dielectric.

Thus, by increasing the permeability of an area of a dielectric by interspersing permeability conversion material within the dielectric area and masking another adjacent area of the dielectric so as to prevent the permeability conversion material from entering that area, the present invention advantageously achieves control over the particular area of the dielectric in which the permeability conversion material is dispersed. For example, the permeability conversion material may be dispersed only in an area of the dielectric that includes an inductor, and not in a neighboring dielectric area of the same dielectric layer.

Additionally, by interspersing the permeability conversion material within the second area of the dielectric, the amount of permeability conversion material can be advantageously controlled to achieve a desired increase in the permeability of the second area of the dielectric after patterning of an inductor in the second area of the dielectric. Thus, since increasing the permeability of the second area of the dielectric increases the inductance of the inductor patterned in the second area, the present invention advantageously allows the inductance of an on-chip inductor to be increased without increasing the size of the inductor.

In contrast to the present invention as defined by amended independent claims 24 and 37, Yokogawa does not teach, disclose, or suggest a conductor or inductor patterned

in a "second area" of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a "first area" of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Yokogawa specifically discloses inductor 2, which includes spiral type coil 3 sandwiched between insulating layers 4. See, for example, the constitution and Figures 1 and 2 of Yokogawa. In Yokogawa, high permeability magnetic substance 5 is situated above one of insulating layers 4 and high permeability magnetic substance 6 is situated underneath one of insulating layers 4. See, for example, the constitution and Figure 2 of Yokogawa. In Yokogawa, spiral type coil 3 is apparently patterned in a dielectric area, which is indicated by a white area situated between windings of spiral type coil 3. See, for example, Yokogawa, Figure 2. Thus, in Yokogawa, the dielectric area in which spiral type coil 3 is patterned (indicated by the white area situated between windings of spiral type coil 3) is situated between insulating layers 4.

However, Yokogawa fails to teach, disclose, or suggest a first area of a dielectric including a conductor or inductor, where permeability of a second area of the dielectric is higher than the permeability of the first area of the dielectric, and where the first area of dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Furthermore, in Yokogawa, the inductance of spiral type coil 3 is increased by sandwiching it between

high permeability magnetic substances 5 and 6, which have large magnetic flux density. See, for example, the constitution and Figure 2 of Yokogawa. In contrast, in the present invention, the inductance of the inductor is increased by increasing the permeability of the dielectric layer in which the inductor is patterned. Moreover, Yokogawa provides no motivation for patterning spiral type coil 3 in a dielectric comprising magnetic oxide, as the Examiner suggests. In fact, patterning spiral type coil 3 in magnetic oxide rather than a dielectric such as silicon oxide would have to be beneficial enough to offset the likely increase in manufacturing cost.

In contrast to the present invention as defined by amended independent claims 24 and 37, Cornett does not teach, disclose, or suggest a conductor or inductor patterned in a "second area" of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a "first area" of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Cornett specifically discloses inductor layer 220 including patterned conductive trace 110, which is embedded within magnetic material layers 221 and 223. See, for example, column 2, lines 18-21 and Figure 2 of Cornett. Thus, in Cornett, magnetic material layer 223, which comprises an insulative magnetic material, is situated over patterned conductive trace 110.

Furthermore, Cornett fails to teach, disclose, or suggest a first area of a dielectric including a conductor or inductor, where permeability of a second area of the dielectric is higher than the permeability of the first area of the dielectric, and where the first area of dielectric is not situated underneath or above the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Cornett discloses a magnetic material, such as amorphous copper ferrite, which is electrically non-conductive but provides a magnetic response at radio or microwave frequencies and is utilized in inductor layer 220. See, for example, Cornett, column 2, lines 52-59. However, Yokogawa does not teach, disclose, or suggest or provide any motivation for patterning spiral type coil 3 in a layer comprising magnetic material as disclosed in Cornett. As discussed above, in Yokogawa, the inductance of spiral type coil 3 is increased by sandwiching spiral type coil 3 between high permeability magnetic substances 5 and 6. Thus, Cornett fails to cure the basic deficiencies of Yokogawa as discussed above.

In contrast to the present invention as defined by amended independent claims 24 and 37, Ewen does not teach, disclose, or suggest a conductor or inductor patterned in a "second area" of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a "first area" of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Ewen is cited by the Examiner to teach a passivation/dielectric layer comprising silicon oxide.

However, Ewen combined with Cornett fails to overcome the deficiencies of Yokogawa as discussed above. Furthermore, Ewen fails to teach, disclose, or suggest a first area of a dielectric including a conductor or inductor, where permeability of a second area of the dielectric is higher than the permeability of the first area of the dielectric, and where the first area of dielectric is not situated underneath or above the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor.

For the foregoing reasons, Applicant respectfully submits that the present invention as defined by amended independent claims 24 and 37 is not suggested, disclosed, or taught by Yokogawa, Cornett, and Ewen, singly, or in any combination thereof. Thus, amended independent claims 24 and 37 are patentably distinguishable over Yokogawa, Cornett, and Ewen. As such, claims 25, 26, and 28-30 depending from amended independent claim 24 and claims 38-48 depending from amended independent claim 37 are, *a fortiori*, also patentably distinguishable over Yokogawa, Cornett, and Ewen for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The present invention, as defined by amended independent claim 31, teaches, among other things, an inductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the second permeability is greater than the first permeability, and where the dielectric is not situated underneath or over the inductor. Thus, as discussed above, the permeability conversion material is interspersed within the dielectric to increase the

permeability of the dielectric. The fact that a permeability conversion material is interspersed within a dielectric, where the permeability of the permeability conversion material is greater than the permeability of the dielectric, where the inductor is patterned in the dielectric prior to the dielectric receiving interspersed permeability conversion material, and where the dielectric is not situated underneath or over the inductor, results in the various advantages discussed above.

As such, and based on the foregoing reasons in relation to amended independent claims 24 and 37, amended independent claim 31 is also patentably distinguishable over Yokogawa, Cornett, and Ewen. Thus, claims 32-36 depending from amended independent claim 31 are also patentably distinguishable over Yokogawa, Cornett, and Ewen for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 24, 31, and 37 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 24-26 and 28-48 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early allowance of claims 24-26 and 28-48 pending in the present application are respectfully requested.

Respectfully Submitted,
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